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seventh rotary shaft 174 involves a rotation of the lower arm 6 relative to the upper arm 4 around the elbow axis E. The shafts of the pack of second drive shafts 170 are again hollow and thin-walled and concentrically positioned relative to each other. An eighth rotary shaft 182 is provided with an eighth driving geared belt wheel 184 adjacent its first end and with a frustoconical eighth driven gear 186 adjacent its opposite end. The ninth rotary shaft 188 is provided with a ninth driving geared belt wheel 190 adjacent its first end and with a frustoconical ninth driven geared belt wheel 192 at its opposite end, the tenth rotary shaft 194 is provided with a tenth driving geared belt wheel 196 adjacent its first end and with a frustoconical tenth driven gear 198 adjacent its second end. The inner eleventh rotary shaft 200 is provided with an eleventh driving geared belt wheel 202 adjacent its first end and with a frustoconical driven eleventh gear 204 adjacent its opposite second end. The frustoconical gears 186, 192, 198 and 204 are substantially fitted one within the other, with the interposition of suitable bearings 205, for instance ball bearings, such that these gears form a frustoconical body.--

In the Claims:

Please amend claim 34 as follows:

Sub 01)
34. (Twice Amended) A manipulator according to claim 19, wherein spaces are provided in the foot part for accommodating spring means for compensating means and electronic components.

Please add the following new claims:

Sub 01)
37
54. A manipulator comprising, in combination:
a foot;
an upper arm rotatable about a shoulder axis relative to the foot;
a lower arm rotatable about an elbow axis relative to the upper arm;

a gripper connected to the lower arm;
motors for moving the upper arm, lower arm and gripper, each motor being provided in the foot; and

a pair of eccentrics in the foot that at least partially compensate for the moments exerted by the upper arm as it moves about the shoulder axis relative to the foot and by the lower arm as it moves about the elbow axis relative to the upper arm such that couples acting on the motors during use are limited.

59 55. A manipulator according to claim 54, wherein the shoulder axis and the elbow axis extend substantially parallel to each other during use, and are located adjacent opposite ends of the upper arm, the gripper being rotatable about at least a first gripper axis relative to the lower arm, the first gripper axis preferably enclosing an angle of approximately 90° with the elbow axis.

39 56. A manipulator according to claim 54, wherein the shoulder axis comprises at least a first rotary shaft and a second rotary shaft, the first rotary shaft being coupled to the upper arm and the second rotary shaft being coupled to the lower arm, the eccentrics comprising a first eccentric coupled to the first rotary shaft and a second eccentric coupled to the second rotary shaft, first and second spring members being coupled to the first and the second eccentrics, respectively, the first and second eccentrics being oriented such that at a maximally reachable horizontal position of the corresponding one of the upper arm and lower arm, a force exerted on the relevant rotary shaft by the corresponding spring member is maximal and at the maximally reachable vertical position of the corresponding one of the upper arm and lower arm, said force is minimal.

40 57. A manipulator according to claim 56, wherein the spring members comprise a first and a second spring that are at least substantially accommodated in the foot, with a first and a second band-shaped element extending from the first and second springs, respectively, over the first and second eccentrics, respectively, an end of each band-shaped element distal from the relevant spring being fixed in position, such that upon rotation of each eccentric by means of the relevant rotary shaft, the relevant spring changes in length.

41 58. A manipulator according to claim 54, further comprising a wrist provided between the lower arm and the gripper, a motor for the wrist being included in the foot.

42 59. A manipulator according to claim 54, wherein each motor is coupled to a reduction casing aligned therewith, each reduction casing being connected to a drive wheel that is connected to one of a plurality of drive shafts.

43 60. A manipulator according to claim 59, wherein a plurality of the reduction casings are mutually identical, each connected to a drive shaft mounting the relevant drive wheel, each paired reduction casing and drive wheel differing from each other paired reduction casing and drive wheel only by the position of the drive wheel relative to the relevant motor.

44 61. A manipulator according to claim 54, wherein at least the upper arm is at least partially hollow, a series of first drive shafts extending from the foot into the upper arm and fitting coaxially one within the other, a series of second drive shafts being provided in the lower arm and fitting coaxially one within the other, a plurality of bearings being positioned between the drive shafts, a plurality of the first drive shafts having a first drive wheel at an end remote from the foot, at least one of the second shafts being provided with a second drive wheel, a first drive wheel in each case being drivingly connected, via a coupling element, to a second drive wheel, the motors in the foot being arranged for driving the respective first drive shafts, such that both the upper arm and the lower arm are movable via the first drive shafts.

45 62. A manipulator according to claim 61, wherein the lower arm includes a series of third drive shafts whose longitudinal direction extends approximately at right angles to a longitudinal direction of the second drive shafts, at least one of the second and third drive shafts being provided with mating frustoconical gears for transmitting rotational movements of the relevant second drive shafts to the relevant third drive shafts, at least one third drive shaft being connected to a wrist movably connected to an end of the lower arm remote from the upper arm.

46 63. A manipulator according to claim 62, wherein the gripper is provided on a side of the wrist remote from the upper arm and is biased in an open position, a spring element extending through the wrist and connected on one side to a block slidable in a longitudinal direction of the upper arm through rotation of one of the third drive shafts and on the other side to the gripper, such that upon rotation of the relevant third drive shaft the block is displaced in the longitudinal direction while displacing the spring element, enabling the gripper to be pulled from the open position into a closed position and vice versa.

D/ 47 64. A manipulator according to claim 54, further comprising a foot plate rotatably connected by a bearing to a lower end of the foot and including a plurality of sliding contacts to provide electrical contact between the motors, a power supply, and a control unit.

C/ 48 65. A manipulator according to claim 64, wherein the bearing for the foot plate comprises an annular groove in an outer surface of the foot plate and a corresponding annular groove on an inner surface of a tube of the foot, both grooves having a substantially V-shaped section such that the two grooves together define a ball track of a substantially rectangular-shaped section, a series of balls being provided in the ball track.

49 66. A manipulator according to claim 65, wherein an opening is provided in the tube, said opening ending in the ball track and having a passage with a width approximately equal to a diameter of the balls, a stop being provided for closing said opening after insertion of the balls.

50 67. A manipulator according to claim 54, wherein the foot is formed from a substantially tubular extrusion section, recesses being provided in the foot to receive the motors.

51 68. A manipulator according to claim 54, wherein spaces are provided in the foot for accommodating spring members for the eccentrics and electronic components.

52 69. Use of a manipulator according to claim 54 in a space unsuitable for human entry.

5p 70. A manipulator according to claim 54, wherein at least one of the upper and lower arms are rotatable at least 360° about an axis.
